

FIRE II Cirrus

Mission Summary



Date: November 29, 1991
Julian Day: 333
Experiment Day: 17

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Mission Scientist: David Starr
 Deputy Mission Scientist: None

Mission Objective:

Cirrus cloud microphysical properties (and radar calibration)

Mission Description:

A radar calibration mission was flown in the early morning on a suitable (warm), dense (pre-drizzle), broken to overcast stratocumulus cloud layer. Later, a microphysical profiling mission was flown in the overlying cirrus shield.

Weather Synopsis:

A very cloudy day with a fairly dense low level stratocumulus overcast - sometimes broken. There were occasional glimpses of the overlying cirrus shield and occasional spits of drizzle. It was warm and windy (southerly) with stationary front located just to our northwest. Temperatures in Wichita rose by 20deg.F in one hour as the front backed up slightly during the morning. Strong thunderstorms moved through the Coffeyville area around 2 p.m.followed by a second line just before sunset. A tornado was reported in the Tulsa area and later near Springfield. Winds turned to westerly and the skies cleared after passage of the pre-frontal thunderstorm system.

Synoptic Situation:

There was general troughiness in the west and a large-scale ridge in the east with this fairly low amplitude westerly pattern. A low level cyclonic circulation over northern New Mexico was evident in the middle and low level clouds as a short wave moved through the Great Basin. At the same time a baroclinic leaf cirrus system associated with a developing storm system in Texas extended from western and central Texas over Kansas to the western Great Lakes. This system was still connected to the tropical upper tropospheric from the southern Baja.

Aircraft	Depart	Land	Notes
NASA ER-2			No flight
NCAR King Air	8:15 CST	8:54 CST	Good status/radar calibration flight, Shortened due to mechanical problem
NCAR King Air	10:06 CST	12:11 CST	Okay ci mission ended by cb development
NCAR Sabreliner			No flight
UND Citation			No flight

Satellite	Hub Overpass Time	Zenith Angle	Azimuth Angle	RAOB
NOAA-11	20:36:53	27.13	72.48	yes
	09:01:18	58.21	97.67	yes
NOAA-12	14:00:24	33.92	101.33	yes
	01:20:18	14.61	73.95	yes

Rawinsonde Operations:

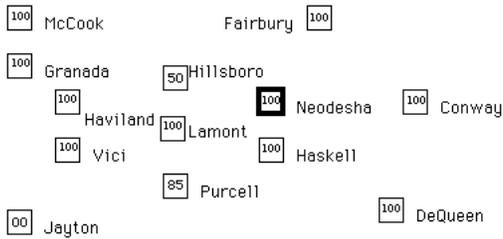
- Inner NWS stations (Type A): Enhanced mode @ 12, 18, and 00 UTC
- Outer NWS stations (Type B): Routine @ 12 and 00 UTC
- Hub CLASS station: Enhanced mode @ 12, 18, and 00 UTC
 - and satellite overpasses @ 15, 21, 02, 09 UTC
 - ice replicator attached to 15 UTC flight
- Remote CLASS stations: Enhanced mode @ 12, 18, and 00 UTC
- Hub GSFC/WFF station: Launched at 00, 02, 03, 05 UTC
- CSU Parsons station: Launched at 16 UTC

FIRE Profiler Status:

- CSU 405 MHz @ Parsons: Continuous operation
- PSU 50 MHz @ Coffeyville: Continuous operation
- NOAA 405 MHz @ Coffeyville: Not operational

NWS Wind Profiler Status:





SPECTRE Operations:

A great night of observations! The clearest, most aerosol free conditions yet encountered during the experiment. Two spectrometers and the Raman system carried the night. A cold frontal passage was observed by the Raman system at the beginning of the evening.

Aircrew/Mission Scientist Debrief Notes:

The planned King Air mission was cut short by a mechanical problem. However, the problem was rapidly fixed and the mission was completed during a second flight.

- NCAR KING AIR #1: Ascended to the top of a dense stratocumulus layer cloud top (7.6K' and +3deg.C) composed entirely of liquid drops. Cloud base was at 3.7K', 884 mb and 10deg.C. The observer reported very little turbulence and fairly homogeneous conditions. A leg was flown over the radars at 500' below cloud top followed by a 500' per minute spiral to below cloud base. The cloud was in a pre-drizzle stage of development as drops as large as 400 um were observed. The mechanical problem occurred at 12K' during a ramp-up ascent through the stratus cloud and into the very dry air between it and the cirrus aloft (~22K'). The radar operators were very pleased with the calibration exercise - returns approached saturation. Note that millimeter-sized drops were detected on climb-out for second mission.
- NCAR KING AIR #2: Sampled cirrus layer extending from 20 to 28K' with a haze layer aloft. The cirrus layer progressively merged downward toward the "nimbo" stratus layer that was capped by a strong inversion. Later, cumulonimbus clouds developed rapidly, penetrating through the existing cloud layers at which time the mission was quickly terminated. The cirrus were described as bands that were rapidly advecting away at nearly 100 knots. Cloud base winds were initially observed at 78 knots. Two penetrations of the bands were made.

Highlights of FIRE Operations:

- An excellent calibration of the radars was obtained for a pre-drizzle, all-liquid phase cloud.
- A great SPECTRE night - most aerosol free clear sky conditions yet.

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Instrument Logs

Active Sensors

Active Sensor	UTC Hour																								Notes	
	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11		
Utah Lidar H																										NO OBSERVATIONS
LaRC Laser Ceilometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Wisc HSR Lidar H																										NO OBSERVATIONS
Wisc Vol Image Lidar																										NO OBSERVATIONS
GSFC RAMAN Lidar H														X	X	X	X	X	X							
NOAA CO2 Lidar H			X																							
NOAA Radar H	X	X	X	X	X	X	X	X																		CATASTROPHIC FAILURE OVERNIGHT, DOWN FOR REST OF OPERATION
PSU Radar H	X	X	X	X	X	X	X																			
PSU Laser Ceilometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	INTERMITTENT DATA QUALITY
PSU 50 MHZ Wind Prof H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
PSU/NOAA 50 MHZ RASS H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SOME DATA LOSS DUE TO HIGH WINDS
NOAA 405 MHZ RASS H																										NOT OPERATIONAL
LaRC Lidar P																										NO OBSERVATIONS
CSU Wind Prof/RASS P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	RASS FROM 15 TO 18 UTC
CSU Laser Ceilometer P	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

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Passive Sensors

Passive Sensor	UTC Hour																								Notes	
	12	13	14	15	16	17	18	19	20	21	22	23	00	01	02	03	04	05	06	07	08	09	10	11		
NOAA μ-wave Radiometer H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA Sun Photometer H																										NO OBSERVATIONS
NOAA H2O Photometer	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
NOAA IR Flux Radiom. H	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

